Effect of Digested Effluent of Manure on the Growth and Yield of Dwarf Napiergrass in Southern Kyushu, Japan

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Key words : dwarf napiergrass ,digested effluent of manure ,yield

Introduction In the grassland farming , nutrients should be recycled throughout a network of grazing and cut-and-carry systems (Di et al . , 1999) . It is an urgent matter to cope promptly with the abundant manure produced from the livestock production in southern Kyushu of Japan , and one solution to these situations might be an operation of bio-gas plant . However , the bio-gas plant daily produces the digested effluent of manure (DEM) solution , which assumes one kind of efficient organic" fertilizer , while the application of DEM solution to the tropical pasture remains to be assessed yet in Japan . Dwarf-late (DL) napiergrass pasture can be utilized permanently under the rotational grazing in Miyazaki , southern Kyushu (Ishii et al . , 2005) . This study was conducted to determine the effect of DEM solution on the growth and yield of DL napiergrass at the established year in southern Kyushu .

Materials and methods Dwarf-late (DL) napiergrass was transplanted at 2 plants/m^2 (50 cm × 100 cm) on May 10 , 2007 . The DEM solution was applied twice at 27 and 63 days after the establishment and twice after the first and second cuttings at 3 levels ; 2 .4 , 1 .2 and 0 .6 L/m^2/time (5 .04 , 2 .52 and 1 .26 g N/m^2/time) for H , M and L levels , respectively , and chemical compound fertilizer at 18 g/m^2/time (5 .04 g N/m^2/time) was applied on the same day as a check (C) . The N (NO_3^- plus NH_4^+) content of DEM solution was determined by ion-analyser (Model : IA-300 , Toa-DKK Co . Ltd .) . The plots were arranged at 3 replications by a blocked design . Herbage yield was determined for 3 plants per plot by cutting plants at 10 cm and 15 cm above the ground level for the first and the second-third cuttings , respectively .

Table 1 *Annual mean in plant characters[*] at the cutting of the dwarf-late napiergrass .*

Cutting time	Level	PH (cm)	TN (no ./m^2)	DMY (g/m^2)	PLB (%)
I	L	90 .5	28 .7	196 .7	81 .0
(Aug . 14)	M	96 .5	36 .5	260 .5	79 .0
	H	106 .6	44 .5	330 .9	76 .0
	C	106 .3	38 .9	311 .2	72 .9
II	L	91 .0	59 .6	109 .4	92 .4
(Sep . 18)	M	97 .0	71 .9	153 .5	92 .1
	H	100 .8	82 .2	174 .2	92 .0
	C	100 .9	85 .5	239 .2	91 .7
III	L	76 .5	64 .2	112 .0	90 .6
(Oct . 29)	M	88 .0	76 .2	147 .5	87 .8
	H	92 .3	87 .1	162 .1	86 .0
	C	101 .1	90 .1	261 .4	80 .3

[*] PH : plant height , TN : tiller number , DMY : dry matter yield , PLB : percentage leaf blade .

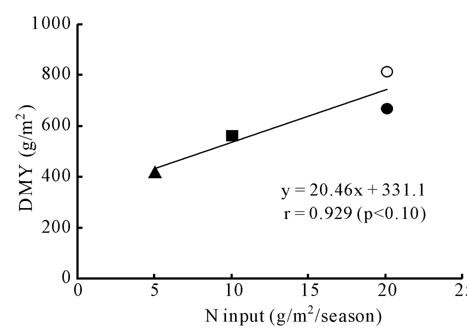

Figure 1 *Relationship between annual total of dry matter yield (DMY) and annual total of N input in the dwarf-late napiergrass at the established year .*
DEM solution : (●) H level , (■) M level , (▲) L level .Chemical compound fertilizer : (○) C level .

Results and discussion Plant characters , such as plant height , tiller number and dry matter yield , increased consistently with the increase in DEM solution and the difference in plant growth between H and C level was minimal , except for the third cutting (Table 1) . Annual total of dry matter yield was closely correlated with the input of N supply ($r = 0.929$, $P < 0.10$) ; irrespective of DEM solution and/or chemical compound fertilizer (Figure 1) . Thus , DEM solution , produced from the bio-gas plant , can be assessed as a rapidly effective organic" fertilizer , as in the chemical compound fertilizer to dwarf napiergrass . Under the H level , dwarf napiergrass pasture can be supplied by 4 times of split-application at 96 kL (m^3) /ha of DEM solution for the growing season (June to October) .

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